Health Consultation

Summary of Community Health Concerns
Georgia Pacific Pulp and Paper Mill
Clark County, Washington

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Prepared by

The Washington State Department of Health
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

Foreword

The Washington State Department of Health (DOH) has prepared this health consultation in cooperation with the Agency for Toxic Substances and Disease Registry (ATSDR). ATSDR is part of the U.S. Department of Health and Human Services and is the principal federal public health agency responsible for health issues related to hazardous waste. This health consultation was prepared in accordance with methodologies and guidelines developed by ATSDR.

The purpose of this health consultation is to identify and prevent harmful human health effects resulting from exposure to hazardous substances in the environment. Health consultations focus on a limited number of specific health issues so that DOH can respond quickly to requests from concerned residents or agencies for health information on hazardous substances. DOH evaluates sampling data collected from a hazardous waste site, determines whether exposures have occurred or could occur, reports any potential harmful effects, and recommends actions to protect public health. Where data is limited or unavailable, DOH identifies critical data gaps that need to be filled so that solid public health decisions can be made.

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Glossary

Acute	Occurring over a short period of time. An acute exposure is one which lasts for less than 2 weeks.
Agency for Toxic Substances and Disease Registry (ATSDR)	The principal federal public health agency involved with hazardous waste issues, responsible for preventing or reducing the harmful effects of exposure to hazardous substances on human health and quality of life. ATSDR is part of the U.S. Department of Health and Human Services.
Chronic	A long period of time. A chronic exposure is one which lasts for a year or longer.
Contaminant	Any chemical that exists in the environment or living organisms that is not normally found there.
Dose	A dose is the amount of a substance that gets into the body through ingestion, skin absorption or inhalation. It is calculated per kilogram of body weight per day.
Epidemiology	The study of the occurrence and causes of health effects in human populations. An epidemiological study often compares two groups of people who are alike except for one factor, such as exposure to a chemical or the presence of a health effect. The investigators try to determine if any factor (i.e., age, sex, occupation, economic status) is associated with the health effect.
Exposure	Contact with a chemical by swallowing, by breathing, or by direct contact (such as through the skin or eyes). Exposure may be short-term (acute) or long-term (chronic).

Hazardous substance	Any material that poses a threat to public health and/or the environment. Typical hazardous substances are materials that are toxic, corrosive, ignitable, explosive, or chemically reactive.
Indeterminate public health hazard	Sites for which no conclusions about public health hazard can be made because data are lacking.
Media	Soil, water, air, plants, animals, or any other part of the environment that can contain contaminants.
No apparent public health hazard	Sites where human exposure to contaminated media is occurring or has occurred in the past, but the exposure is below a level of health hazard.
No public health hazard	Sites for which data indicate no current or past exposure or no potential for exposure and therefore no health hazard.
Route of exposure	The way in which a person my contact a chemical substance that includes ingestion, skin contact and breathing.
U.S. Environmental Protection Agency (EPA)	Established in 1970 to bring together parts of various government agencies involved with the control of pollution.

Background and Statement of Issues

The Washington State Department of Health (DOH) prepared this health consultation to document community health concerns potentially related to air emissions from the Georgia Pacific Pulp and Paper Mill (GPM) located in Clark County, Washington. This health consultation was prepared under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR).

The GPM is located on the north side of the Columbia River at the corner of 4th and Adams, (Figure 1) approximately 8 miles east of Vancouver, Washington. The mill was built by the Columbia River Paper Company in the late 1800s and is presently an operating pulp and paper mill located within the downtown area of the City of Camas. In 1999, the estimated population of Clark County was 337,000 and the total population of Camas was estimated to be 10,870.[1] Based on the 2000 census, there were 4,824 people living within one-mile of the GPM site. The demographic characteristics of this population are outlined in Figure 2.[2]

On January 20, 2001, an air release of black liquor mist from the GPM drifted into neighborhoods adjacent to the mill. The release of black liquor was caused by over-pressurized equipment that triggered a pressure release valve allowing the mist to escape. Black liquor is a recycled by-product formed during the pulping of wood in the papermaking process. Black liquor consists of dissolved lignin, water, and chemicals used for extraction of lignin from wood.[3] Lignin is a glue that is used to bond wood fibers. Black liquor is used as an energy source by burning in boilers and combustion of black liquor creates aerosols and other chemical by-products. Ash deposition from boilers and recovery furnace can also occur. Black liquor ash contains sodium hydroxide and sodium sulfide. Following the black liquor release episode, the Department of Ecology (Ecology) immediately investigated the incident and issued a corrective action order in early February 2001 to require the GPM to develop a standard operating procedure to prevent the recurrence of a similar incident. The GPM provided vouchers for community members to have cars washed and also arranged for pressure washing of homes in the area affected by the release of black liquor.

On February 15, 2001, the mill reported three gas releases lasting a total of 25 minutes. The releases occurred while the mill was shutting down a recovery furnace for repair. Follow-up investigation by the mill indicated that the initial release occurred at 12:10 - 12:20 pm and was attributed to over-loading in the gas line that tripped a fan. The second release occurred from 12:34 - 12:44 pm and was due to an erroneous reading from a new transfer system. The third release, between 1:13 - 1:18 pm, was considered normal venting caused by transferring gases between a recovery furnace and lime kiln.[4] These releases contained non-condensable gases including hydrogen sulfide, methyl mercaptan, di-methyl sulfide, and di-methyl disulfide. The cloud of gases released from the mill drifted in a westerly direction.

The same afternoon, February 15, 2001, fifty-two children at Fishers Landing Elementary School reported ill, variably experiencing dizziness, nausea, and vomiting. Symptoms were resolved

without medical treatment for all but one child who was taken to a local hospital to be treated for breathing problems. Approximately 700 students were evacuated from the school which is located about 4 miles west of the mill. In addition to effects reported at the school, other symptoms were reported by individuals located between the mill and the school. The symptoms were attributed, by those experiencing them, as being caused by the accidental releases from the GPM.

In April 2001, Ecology fined the GPM $10,000 and also ordered an independent evaluation of the gas burning process by the mill.[4] The process evaluation was anticipated to be completed within six months and will include evaluations of the mill's training program, non-condensable gas treatment system, and system testing protocols. In addition, the evaluation will recommend methods for notification of regulatory agencies, state and local health, and general public that may be impacted in case of a release.

A community meeting was held on June 7, 2001, from 7-9 pm at the Camas Police Station. The meeting was sponsored by the City of Camas and Southwest Washington Health District. DOH, Ecology, ATSDR, Southwest Washington Clean Air Agency (SWCAA), and GPM representatives participated. The purpose of the meeting was to clarify the roles that various state and local agencies have in responding to emissions from the mill, to communicate who has regulatory authority over the mill, and to listen to and discuss health concerns relating to emissions from the GPM. Prior to the meeting, the Health Officer for the Southwest Washington Health District and local residents formulated five questions to be addressed by agencies that would serve as a starting point for broader community dialogue about health concerns.[5] Materials were made available during the meeting that addressed theses five questions. Specific responses to each question are summarized below.

1. <u>Is asthma or some other health condition a suitable marker for determining acute and long-term effects from exposure to gas releases from the GPM?</u>

   Correlations between hospital, emergency room visits and physician visits for asthma have been published in a number of studies. Asthma is a complex illness that varies in extent and severity among individuals. Exposure to irritant gases has been implicated in causing asthma in industrial settings. Exposure to other allergens, irritant gases, cold air, physical and emotional stress and exercise have been shown to initiate asthma attacks. A recent study by ATSDR presented at the American Thoracic Society Meetings during May 2001, performed a time series analysis of daily hospital visits and measures of Total Reduced Sulfur (TRS) compounds and hydrogen sulfide (H_2S). A positive association for children less than 18 years was found between asthma hospital visits and one-day lagged TRS levels. A positive association was also found between asthma hospital visits and a one-day lagged H_2S level in adults. Additionally, a positive association was found between hospital visits for all respiratory diseases and one-day lagged H_2S levels and one-day lagged TRS levels.

TRS generated in the GPM is composed of hydrogen sulfide, methyl mercaptan, di-methyl sulfide, and di-methyl disulfide. Mercaptan has a skunky odor (it is about 10 times less potent as a toxic substance than H_2S) while H_2S smells like rotten eggs at low concentrations. The combined odor of the TRS gases may not be distinctly the odor of rotten eggs or skunk, but a different complex odor. Odor complaints have been registered with the City of Camas, SWWHD, and SWCAA that describe the odor as being different from characteristic mill odors people in the area had noted in the past. Citizens report that this odor irritates the eyes and the respiratory tract, can awaken people from sleep, and causes a sensation of "not being able to breathe."

Asthma can be a relatively non-specific indicator for exposure to irritant gases, of which TRS (also called non-condensable gases) are one class. Acute exposures to such gases could be tracked if monitoring in the community were done over a period of time sufficient to encompass a fair number of odor episodes, and if tracking of asthma-related indicators (ER visits, hospitalizations, physician visits or medication use) was conducted over the same time period. However, the reported effects are not necessarily related to TRS gases, or may result from exposure to these or other as yet unidentified components of mill emissions.

2. Is there historical information (trends/comparisons) about general health effects on residents in the Camas area?

Public health agencies have limited information on general health conditions of the state's residents. The health conditions of most interest to a community, such as respiratory disease, miscarriage, nausea and headache, are often not the types of health events about which information is collected. Available data indicate that the major causes of death in the Camas area are the same as in the state as a whole. These data also indicate that the number of deaths from these causes is not different from the rest of the state although subtle differences are hard to detect when examining small populations such as Camas.

3. Is there cancer incidence and mortality data for the Camas area?

The Washington State Cancer Registry has collected information on all Washington residents diagnosed with cancer since 1992. Information includes the type of cancer, age and ZIP code of the person's residence at diagnosis. Data sharing agreements with Oregon and Idaho assure that we obtain information on Washington residents who have cancer even if they are not diagnosed and treated in Washington. Information on cancer mortality is available from the death certificate system. The cancer data do not suggest large differences in the amount of cancer in the Camas area compared to Washington State as a whole.

However, there may be elevations in cancer that we have not been able to identify because: 1) cancer is very common with many different subtypes, 2) cancer takes a long

time to develop and 3) the population in the Camas area is relatively small. These types of analyses usually reassure us that there is nothing hugely awry related to cancer in a small community. They are not useful for discovering subtle increases in cancer rates. However, unless a large number of people are exposed to high levels of carcinogens, community cancer studies do not yield useful information regarding causes of cancer.

4. How long a time period for cumulative effects to show up?

The potential for adverse health effects to result from exposure to chemicals in the environment can be immediate or delayed depending on the chemical and type of exposure. Some chemicals that may be coming from the mill can cause immediate effects such as respiratory irritation, nausea and headaches. It is much more difficult to associate long-term exposure with health effects that might develop after many years. The length of time it may take for such long-term effects to appear will rely entirely upon the type of effect and the exposure. Certain diseases, such as cancer, can take many years or even decades to appear. More information is necessary to evaluate whether exposure to mill emissions poses a long-term health risk. In order to relate health effects in the community to emissions from the mill, we need to know what gases are potentially impacting people in the community. At present, we know that people complain of a new odor, but we do not yet know what the substances are that are impacting people who are having reactions.

5. Which are the best fact sheets on the substances in the gas releases?

DOH has prepared a fact sheet on hydrogen sulfide. The fact sheet is available on the department web site at http://www.doh.wa.gov/ehp/factsheets.htm. In addition, ATSDR has developed a toxicological profile for hydrogen sulfide. A copy of the profile is available for review at the Camas public library. These fact sheets specifically relate to the release of non-condensable gases that occurred on February 15, 2001. We do not yet know the composition of the gases that comprise the"new odor" and so have not been able to provide fact sheets on these substances.

Documented attendance at the meeting consisted of 60 individuals (completed meeting sign-in sheet), however, the actual number of people that attended the meeting in the community room of the police station was approximately 100 individuals. Participants expressed concerns that ranged from fears about potential mill closure to health and nuisance odor effects from mill emissions. Prior to the meeting, representatives from DOH and ATSDR were available to gather community concerns. A total of 31 interviews were conducted before the meeting. After the meeting DOH continued to receive calls from community members expressing health concerns potentially related to mill emissions.

Discussion

Considerable community concern exists in Camas and surrounding neighborhoods regarding potential health effects of odors and gases from the GPM. Local residents are concerned about the potential impact of both past and current mill emissions on the health of their families. Community members expressing concern about mill emissions have contacted a number of federal, state, and local agencies.

The following is a summary of health concerns gathered from interviews during the availability session held just prior to the community meeting the evening of June 7, 2001.

Community Concerns

A number of residents expressed significant concern about a new odor that has been noticed over the past year since Georgia Pacific has taken over operation of the mill. Residents strongly feel that this new odor is associated with health effects. There were a number of residents who complained of a strong odor that would occur late in the evening or early morning and wake them from sound sleep. Residues were reported on homes and described as yellow, white, or black in appearance. Concerns were also expressed about mill operation noise, odors and the possibility of dioxin in soils. A concern was also raised about synergistic effects of chemicals when mixed together and how that would impact contaminant toxicity. There is a perception that the mill releases emissions late at night or during the early morning to avoid detection.

Local residents expressed a number of health concerns including: asthma, cancer, lung disease, multiple sclerosis, lupus, fibromyalgia, and cases of multiple chemical sensitivity. Local residents are concerned about the health and welfare of their children and significant concern was expressed over children missing school due to various symptoms. Residents were very concerned about the potential effects of mill emissions on the central nervous systems of their children. Concern was also expressed regarding the many cases of asthma diagnosed among school children.

Long-term, low-level exposure to routine mill emissions was also identified as a concern among residents. It is important to distinguish this concern from the episodic exposure that resulted from the three releases discussed above. Individuals attending the community meeting also expressed fears about possible closure of the GPM and the economic impacts that could result.

Using Geographic Information System (GIS) technology (Arcview 3.2), DOH plotted addresses of individual community members that have either been interviewed by DOH staff or contacted DOH with health concerns. The locations of these residences were combined on a map along with the GPM and Fishers Landing Elementary School. Review of the map indicates that the majority of the community health concerns originated west of the GPM. The map was not included in this document in order to preserve the confidentiality of those citizens expressing health concerns. A vicinity map is included for visual reference (Figure 1). Home locations of

community members expressing health concerns may be useful for comparisons with future air dispersion modeling and/or sampling.

Common Symptoms of Residents

Of the 41 residents expressing health concerns; 15 reported eye irritation, 13 reported shortness of breath, 12 reported excessive coughing spasms, and 11 reported chronic throat irritation. There were several reports of headaches, insomnia and sleep apnea, skin rashes, nausea, joint pain, and increased congestion. Other less common symptoms included nose irritation, nose bleeding, ear problems, fatigue, numbness, dizziness and disorientation, and anxiety.

Thirteen of the interview respondents reported being diagnosed with asthma since moving into the area and seven had experienced recent respiratory-related trips to the local hospital emergency room. Residents also reported cases of pets (dogs and cats) being diagnosed with asthma by their veterinarians.

Community Member Suggestions

Community suggestions for follow-up activities for mill emissions:

- Additional air monitoring
- Collect soil and water samples
- Investigate potential cancer clusters
- Educate community regarding methods to reduce and treat exposure to mill emissions
- Educate local physicians to better diagnose and treat exposures
- Fire department training for evacuations
- Evaluate school attendance records and compare to schools in other communities.

Child Health Initiative

ATSDR and DOH recognize the unique vulnerability of infants and children, and that site-specific evaluation regarding children's exposure to environmental contaminants is required. Children and other sensitive populations are more likely to experience health problems related to contaminants in the environment. Infants, children, and developing fetuses may be at greater risk for potential exposure and adverse health effects compared to older children or adults.[6]

Children breathe more air than adults per body weight and, therefore, receive a higher dose of air contaminants. As a result, given the same level of exposure, children receive a significantly higher contaminant dose than adults. For the purposes of this health consultation, children are defined as "the period from conception to maturity at 18 years of age, when all biological

systems have matured." It is also important to note that children, asthmatics, and the elderly are sub-populations that are very sensitive to air pollution.

Conclusions

An indeterminate public health hazard exists for individuals living near the Georgia Pacific Pulp and Paper Mill who may be acutely or chronically exposed to air emissions.[1] The site is considered an indeterminate public health hazard because critical data gaps exist that prohibit the evaluation of potential exposure.

Releases of non-condensable gases from the GPM appear to have resulted in eye, nose and throat irritation in children at Fishers Landing Elementary School located west of the mill. In addition, a number of odor and health complaints from the community have been documented by various federal, state, and local agencies. However, the extent of exposure within the community is uncertain because contaminant concentrations of pollutants in off-site air have not been confirmed via environmental air sampling.

In order to determine the nature and extent of exposure, information is needed regarding the type of contaminants, concentrations, local weather patterns (such as wind speed and direction), duration and frequency of emissions and dispersion of contaminants. It should be noted that other point sources and non-point sources can contribute to the over-all amount of air pollution. The GPM emissions are regulated under permit by Ecology.

Releases of black liquor vapor and non-condensable gases earlier this year have raised considerable community concern regarding the potential health impact of both past and continuing air emissions from the mill. Although DOH has gathered information about health concerns from the community, a systematic documentation of community health concerns does not yet exist. A means of identifying, documenting and maintaining community health concerns needs to be developed among appropriate agencies.
In addition, community members have also reported a new odor over the past year. Changes in process or operating practices during this time period, could have resulted in a different mix of emissions. Tracking of odor complaints and correlation with specific activities occurring at the mill could lead to identification of emissions responsible for the increase in complaints and reported health effects.

[1]Refer to attachment #1 for definitions of public health hazard categories.

Recommendations/Action Plan

1. **Track health complaints from community members specifically identifying the date, time, and nature of the health complaint.**

   DOH will coordinate with Southwest Washington Health District, Ecology, Southwest Clean Air Agency, GPM and other agencies to develop and maintain a clearinghouse for health complaints. DOH will contact other agencies to obtain historical concerns for inclusion in a health complaint tracking database. Creation of this database will ensure health concerns and complaints from the community continue to be documented.

   This information may prove useful in identifying changes in GPM operational practices and help to address the community concern regarding the presence of a new odor that has been noticeable for the past 6 months.

2. **Conduct air dispersion modeling of maximum permitted mill emissions (criteria and non-criteria pollutants) predicting levels of ambient air contaminants at locations considered to be worst-case exposure scenario areas.**

   Air emissions from the GPM should be modeled in order to further characterize the potential contribution of pollutants from the mill and evaluate the potential impact on the surrounding community in areas anticipated to be high exposure areas. Modeling should, at a minimum, include total reduced sulfur compounds.

3. **Evaluate the results of air dispersion modeling to assist in determining the need for ambient air sampling within the community.**

   Ambient air sampling may provide a more complete picture of the contaminant composition present in mill emissions. Community members have expressed concern about a distinct new odor that has been noticeable for the past year.

4. **Provide informational materials to the local community.**

   DOH has established a collection of resource materials for community members at the Camas public library. DOH will continue to expand upon the materials available and establish other locations for information if needed.

5. **Provide physician education within community.**

   DOH will contact the education coordinator at the local hospital to explore the possibility of sponsoring a Continuing Medical Education (CME) session designed to educate physicians on taking exposure histories of patients in order better to evaluate potential environmental exposures.

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Appendix

Attachment 1

Public Health Hazard Conclusion Categories[7]

Category	Definition
1. Urgent Public Health Hazard	This category is used for sites where short-term exposures (<1 yr) to hazardous substances or conditions could result in adverse health effects that require rapid intervention.
2. Public Health Hazard	This category is used for sites that pose a public health hazard due to the existence of long-term exposures (>1 yr) to hazardous substances or conditions that could result in adverse health effects.
3. Indeterminate Public Health Hazard	This category is used to sites in which "critical" data are insufficient with regard to extent of exposure and/or toxicologic properties at estimated exposure levels.
4. No Apparent Public Health Hazard	The category is used for sites where human exposure to contaminated media may be occurring, may have occurred in the past, and/or may occur in the future, but the exposure is not expected to cause any adverse health effects.
5. No Public Health Hazard	This category is used for sites that, because of the absence of exposure, do NOT pose a public health hazard.

References

1. State of Washington, Office of Financial Management, Forecasting Division. April 1, 1999 Population of Cities, Towns, and Counties. 6/30/1999.

2. Washington State Department of Health, Demographic map for Georgia Pacific Mill calculated using 2000 U.S. Census STF-1B data.

3. Department of Energy: Office of Energy Efficiency and Renewable Energy: Office of Industrial Technologies. Black Liquor fact sheet.

4. Washington State Department of Ecology News Release April 26, 2001.

5. Agenda for Community Meeting relating to emissions from Georgia Pacific Pulp and Paper Mill in Camas, Washington. June 7, 2001.

6. ATSDR Guidance on Including Child Health Issues in Division of Health Assessment and Consultation Documents. July 2, 1998.

7. ATSDR Public Health Assessment Guidance Manual 1992.